



No.	Author	Date
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	Title	
	2005-2006 Small Game Harvest Survey	

**Abstract:** A biennial survey of Indiana small game hunters was conducted following the 2005–2006 hunting season to determine harvest and hunter participation. Estimates derived from this survey were qualitatively compared to estimates from the most recent small game survey (2003–2004). A total of 176,674 people held a legal hunting license during the 2005–2006 season; down 12.1% from 201,005 license holders during the 2003–2004 season. Following the 2005–2006 season, questionnaires were sent to 14,995 license holders and returned by 3,390 (22.6%). Correspondingly, the estimated number of people that actually hunted  $\geq 1$  small game species was 121,022, down 18.9% from 149,336 during the 2003–2004 season. The only group of hunters that increased from 2003–2004 were Virginia opossum (+23.6%) hunters. Total harvests were down for each small game species except for an apparent increase in three furbearer harvests; Virginia opossum (+89.8%), gray fox (+20.4%), and eastern coyote (+16.3%).

**Work Plan #: 300FW0WILD07517**

Small game harvest surveys have been conducted in Indiana from 1940–1966, 1976–1999, 2000, 2003, and 2005. For the purpose of these harvest surveys, small game species include eastern cottontail (*Sylvilagus floridanus*), northern fox squirrel (*Sciurus niger*), eastern gray squirrel (*Sciurus carolinensis*), mourning dove (*Zenaidura macroura*), northern bobwhite (*Colinus virginianus*), wild ring-necked pheasant (*Phasianus colchicus*), put-and-take ring-necked pheasant, ruffed grouse (*Bonasa umbellus*), American woodcock (*Scolopax minor*), American crow (*Corvus brachyrhynchos*), raccoon (*Procyon lotor*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), Virginia opossum (*Didelphis virginiana*), and eastern coyote (*Canis latrans*).

## Methods

Following the 2005–2006 small game season, Harvest survey questionnaires (Figure 1) were delivered to license holders spread across the following license types: resident hunting (RHT), resident hunting and fishing (RHF), youth consolidated hunting (YCH), non-resident annual hunting (NHT), non-resident 5-day hunting (NR5),

all types of lifetime hunting licenses (lifetime). A mailing list was developed with names and addresses from a stratified random sample of 5% of each annual license type from each county in proportion to license sales in the previous year. Additionally, names and addresses were also gathered from a stratified random sample of 10% of the lifetime license database. A small game harvest survey was sent to each address in the resulting database in March of 2006. In May of 2006, a follow-up mailing was sent to most of the individuals who did not initially respond. For analysis purposes, the state was stratified into 6 small game harvest regions (Figure 2B). Harvest parameters for all small game species included in this survey were stratified by these regions except for ring-necked pheasant harvest parameters, which were stratified across 5 Indiana regions (Figure 2A). Harvest and effort parameters derived for this report were quantitatively compared to the same parameters calculated in the most recent small game survey (2003–2004).

## Results

Initially sent to 14,995 Indiana hunting license holders, 12,991 small game harvest



questionnaires were delivered successfully. A total of 3,390 people returned their questionnaires yielding a 26.1% response rate. The reported response rate was similar to the 23.8% and 19.0% rates observed for the 2000–2001 and 2003–2004 surveys, respectively. The estimated number of hunting license holders in Indiana during the 2003–2004 season was 176,674, down 12.1% from the 2003–2004 estimate of 201,005 (Figure 3). Of 3390 questionnaires returned by license holders, a total of 2324 (68.5%) actually hunted  $\geq 1$  small game species during the 2005–2006 season, resulting in an estimate of 121,022 small game hunters, a 19.0% decrease from 2003–2004. Excluding furbearer hunting, an estimated 113,770 sportsmen hunted  $\geq 1$  tradition small game species (eastern cottontail, fox squirrel, gray squirrel, mourning dove, northern bobwhite, ring-necked pheasant, ruffed grouse, American woodcock, and American crow) during the 2005–2006 season.

#### Eastern Cottontail

An estimated 39.6% of resident license holders and 55.4% of resident small game hunters pursued eastern cottontail in Indiana during the 2005–2006 season. An estimated 69,210 rabbit hunters harvested 201,343 eastern cottontails during the 2005–2006 season. In comparison to the 2003–2004 season, the number of eastern cottontail hunters across the state decreased by 17.3% and total harvest was down by an estimated 22.7%. The average eastern cottontail hunter in Indiana spent 4.77 days in the field (–0.6% from 2003–2004) and harvested 2.91 rabbits (–6.5% from 2003–2004) during the 2005–2006 season.

#### Fox Squirrel

An estimated 38.6% of resident license holders and 53.9% of resident small game hunters pursued fox squirrels in Indiana during the 2005–2006 season. An estimated 67,230 fox squirrel hunters harvested 241,784 fox squirrels during the 2005–2006 season. In comparison to the 2003–2004 season, the number of fox squirrel hunters decreased by 26.8% and these hunters were less successful resulting in a 32.9% decline in overall harvest. The average fox squirrel hunter in Indiana spent 5.32 days in the field (–1.0% from 2003–2004) and harvested 3.60 fox squirrels (–8.3% from 2003–2004) during the 2005–2006 season.

#### Gray Squirrel

An estimated 25.3% of resident license holders and 35.3% of resident small game hunters pursued gray squirrels in Indiana during the 2005–2006 season. An estimated 44,090 gray squirrel hunters harvested 100,835 gray squirrels during the 2005–2006 season. In comparison to the 2003–2004 season, the number of gray squirrel hunters across the state decreased by 26.5%, resulting in a 43.2% decline in total harvest. The average gray squirrel hunter in Indiana spent 5.37 days in the field (+4.9 from the 2003–2004) and harvested 2.29 gray squirrels (–22.7% from 2003–2004) during the 2005–2006 season.

#### Mourning Dove

An estimated 16.2% of resident license holders and 22.6% of resident small game hunters pursued mourning doves in Indiana during the 2005–2006 season. An estimated 28,299 dove hunters harvested 116,234 mourning doves during the 2005–2006 season. In comparison to the 2003–2004 season, the number of mourning dove hunters in the state decreased by 34.0%, with the estimated total harvest declining by 43.6%. The average dove hunter in Indiana spent 2.11 days in the field (–1.3% from 2003–2004) and harvested 4.11 mourning doves (–17.5% from 2003–2004) during the 2005–2006 season.

#### Northern Bobwhite

An estimated 11.4% of resident license holders and 16.0% of resident small game hunters pursued northern bobwhite in Indiana during the 2005–2006 season. An estimated 19,700 quail hunter harvested 28,304 northern bobwhites during the 2005–2006 season. In comparison to the 2003–2004 season, the number of northern bobwhite hunters in the state decreased 28.1% with a corresponding harvest decline of 50.3%. Quail hunters in the south-central region of the state had the greatest success, averaging 0.86 northern bobwhites per day of hunting effort. The least successful quail hunters were those pursuing quail in the northeast region, averaging only 0.19 northern bobwhites per day of hunting effort. The average northern bobwhite hunter in Indiana spent 2.84 days in the field (–12.0% from 2003–2004) and harvested 1.44 bobwhites (–30.9% from 2003–2004) during

the 2005–2006 season. In general, all of the parameters associated with bobwhite hunting in Indiana have decreased from the 2003–2004 season, leading to the highest overall decline in total estimated harvest of any species during the 2005–2006 season.

### Wild Ring-Necked Pheasant

An estimated 8.5% of resident license holders and 11.9% of resident small game hunters pursued wild ring-necked pheasant in Indiana during the 2005–2006 season. An estimated 14,801 wild pheasant hunters harvested 11,879 wild ring-necked pheasants during the 2005–2006 season. In comparison to the 2003–2004 season, the total estimated number of wild pheasant hunters decreased 27.3% and the estimated harvest declined 33.5%. The average wild pheasant hunter in Indiana spent 2.07 days in the field (+7.2% from 2003–2004) and harvested 0.80 pheasants (–9.1% from 2003–2004) during the 2005–2006 season.

### Put-and-Take Ring-Necked Pheasant

An estimated 8.2% of resident license holders and 11.5% of resident small game hunters pursued “put-and-take” ring-necked pheasant on state wildlife areas and private game farms in Indiana during the 2005–2006 season. An estimated 14,467 hunters harvested 43,908 “put-and-take” pheasants during the 2005–2006 season. In comparison to the 2003–2004 season, the total number of put-and-take pheasant hunters decreased 24.5%, and the harvest declined by 37.3%. The average “put-and-take” pheasant hunter in Indiana spent 1.34 days in the field (–13.5% from 2003–2004) and harvested 3.03 “put-and-take” ring-necked pheasants (–15.8% from 2003–2004) during the 2005–2006 season.

### Ruffed Grouse

An estimated 1.2% of resident license holders and 1.7% of resident small game hunters pursued ruffed grouse in legally open counties in Indiana during the 2005–2006 season. An estimated 2,083 grouse hunters harvest an estimated 331 ruffed grouse during the 2005–2006 season. In comparison to results from legal counties during the 2003–2004 season, the number of ruffed grouse hunters in the state decreased 24.3%, and the estimated total harvest declined by 20.0%. The ruffed grouse harvest in the south-central region of the state made up

95.3% (319 grouse) of the total harvest, where the hunter success rate was 0.12 ruffed grouse per day of hunting effort. The average ruffed grouse hunter in Indiana spent 1.46 days in the field (–15.3% from 2003–2004) and harvested 0.16 grouse (+5.7% from 2003–2004) during the 2005–2006 season.

### American Woodcock

An estimated 1.9% of resident license holders and 2.7% of resident small game hunters pursued American woodcock in Indiana during the 2005–2006 season. An estimated 3,335 woodcock hunter harvested 1,180 American woodcock during the 2005–2006 season. In comparison to the 2003–2004 season, the number of American woodcock hunters across the state decreased 22.1%, but the harvest only declined by 5.3%. The average American woodcock hunter in Indiana spent 1.46 days in the field (+3.7% from 2003–2004) and harvested 0.35 woodcock (+22.0% from 2003–2004) during the 2005–2006 season.

### American Crow

An estimated 6.1% of resident license holders and 8.5% of resident small game hunters pursued American crow in Indiana during the 2005–2006 season. An estimated 10,371 crow hunters harvested 33,071 American crows during the 2005–2006 season. In comparison to the 2003–2004 season, the number of American crow hunters in the state decreased 31.2% and the estimated harvest declined by 33.0%. The average American crow hunter in Indiana spent 2.61 days in the field (+35.0% from 2003–2004) and harvested 3.29 crows (–2.5% from 2003–2004) during the 2005–2006 season.

### Furbearers

For this report, furbearers are those that were taken during the regular hunting season (not trapping season) and included the raccoon, Virginia opossum, red fox, gray fox, and coyote. During the 2005–2006 hunting season, a greater percentage of resident license holders pursued coyotes (15.8%) than any other furbearer, followed by raccoons (10.3%), red fox (4.6%), gray fox (3.2%), and Virginia opossum (2.4%).

#### *Raccoon*

Statewide, an estimated 17,928 hunters harvested 138,401 raccoons during the 2005–

2006 season. In comparison to the 2003–2004 season, the estimated total number of raccoon hunters in Indiana decreased 1.3% and the estimated harvest declined by 7.7%. The average raccoon hunter in Indiana spent 9.67 days in the field (–13.1% from 2003–2004) and harvested 7.72 raccoons (–6.5% from 2003–2004) during the 2005–2006 season.

#### *Virginia Opossum*

Statewide, an estimated 4,013 hunters harvested 10,246 Virginia opossums during the 2005–2006 season. In comparison to the 2003–2004 season, the estimated total number of opossum hunters in Indiana increased 23.6% and the estimated harvest rose by 89.8%. The average Virginia opossum hunter in Indiana spent 7.13 days in the field (+1.1% from 2003–2004) and harvested 2.55 Virginia opossums (+53.8% from 2003–2004) during the 2005–2006 season.

#### *Red Fox*

Statewide, an estimated 7,922 hunters harvested 2,464 red fox during the 2005–2006 season. In comparison to the 2003–2004 season, the estimated total number of red fox hunters in Indiana decreased 22.2% and the estimated harvest declined by 11.4%. The average red fox hunter in Indiana spent 4.77 days in the field (+21.4% from 2003–2004) and harvested 0.31 red fox (+15.2% from 2003–2004) during the 2005–2006 season.

#### *Gray Fox*

Statewide, an estimated 5889 hunters harvested 1,457 gray fox during the 2005–2006 season. In comparison to the 2003–2004 season, the estimated total number of gray fox hunters in Indiana decreased 22.1%, but the estimated harvest rose by 20.4%. The average gray fox hunter in Indiana spent 4.86 days in the field (+18.3% from 2003–2004) and harvested 0.24 gray fox (+51.4% from 2003–2004) during the 2005–2006 season.

#### *Eastern Coyote*

Statewide, an estimated 27,048 hunters harvested 21,953 eastern coyotes during the 2005–2006 season. In comparison to the 2003–2004 season, the estimated total number of coyote hunters in Indiana decreased 8.2%, but the estimated harvest rose by 16.3%. The


average eastern coyote hunter in Indiana spent 3.76 days in the field (+10.7% from 2003–2004) and harvested 0.81 eastern coyotes (+26.8% from 2003–2004) during the 2005–2006 season.

## **DISCUSSION**

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Estimates of the annual total harvest provide us with an average number of harvested individuals for a given species; however, these numbers are actually a poor indicator of population dynamics. This is largely due to the long-term decline in small game license holders (Figure 3). If hunter numbers were to remain stable, declining harvests could then be considered a direct indicator of population decline. Since the number of hunters does not remain stable, other harvest parameters, primarily the harvest per effort, must be used to determine indices for population dynamics. Since 1984, the current harvest parameters were established and harvest per effort was recorded. Between 1984 and 2006, the harvest per effort for most of the traditional small game species (eastern cottontail, tree squirrels, northern bobwhite, ring-necked pheasant, mourning dove, and American crow) have had a positive trend, indicating their populations are likely stable or increasing. However, the harvest per effort over the past 20 years has declined for ruffed grouse and American woodcock, species that appear to be disappearing from Indiana. Also, even with an increasing trend, we know that populations of northern bobwhites, ring-necked pheasants, and gray fox remain near record lows. These declining and record low populations can be attributed primarily to habitat loss due to modern farming practices, development, and natural succession. To make matters worse, the loss of cooperative land leases in the Conservation Reserve Program over the next few years, due mostly to high crop prices, will also likely have a detrimental effect on all populations of small game. There is hope when we see indices and hunter success stabilizing or increasing for some species, but we have many challenges. We must create and maintain suitable habitat for all small game species and continue to manage the harvest in the best interest of these species. Without these efforts, small game populations will continue to decline in Indiana.

**Figure 1.** A copy of the questionnaire sent to a random sample of Indiana license holders following the 2005-2006 hunting season.




## SMALL GAME QUESTIONNAIRE

See form 38465 (8/3/14-06)

**Dear Sportsperson:**

The Indiana Division of Fish and Wildlife is conducting a special survey of small game hunters. This information is needed to help us improve management of our small game species. Your answers to this survey are important, **whether you hunted or not.** Please take a few minutes to fill out this survey and return it immediately. Fold with business reply address on the outside. Tape closed. No postage is needed. Thank you!



### PART I

(All license holders complete)

1. What is your county of residence?

\_\_\_\_\_

2. Did you hunt any of the small game species listed below during the 2005-2006 Indiana hunting season?

Yes \_\_\_\_\_ No \_\_\_\_\_

### PART II

(Complete only if you answered yes to question 2)

3. Please complete the following table about your small game hunting activities in Indiana during the 2005-2006 season.


	Did you hunt this animal in Indiana? Please check yes or no for each animal.		County most often hunted	Days hunted	Total Harvest
	Yes	No			
Rabbit					
Fox squirrel					
Gray squirrel					
Dove					
Pheasant (wild)					
Pheasant (game-wild)					
Quail					
Grouse					
Woodcock					
Crow					

### Pheasant and Quail


#### Habitat Incentive Programs

The Indiana Division of Fish and Wildlife has developed habitat priority programs specifically designed to address the population declines of pheasants and quail. Priority areas have been designated for each program with the pheasant areas located in the northern part of the state and the quail areas located in central and southern Indiana. If you own land within one of the designated priority areas you may be eligible for financial assistance to establish or maintain gamebird habitat on your property. For a map of the priority areas and eligible practices contact your local district biologist or read more about the programs at:

[www.wildlife.IN.gov](http://www.wildlife.IN.gov)



Adapted from Robert S. Sauer, Jr., FWS and Wildlife Service




**INDIANA DEPARTMENT OF FISH AND WILDLIFE**

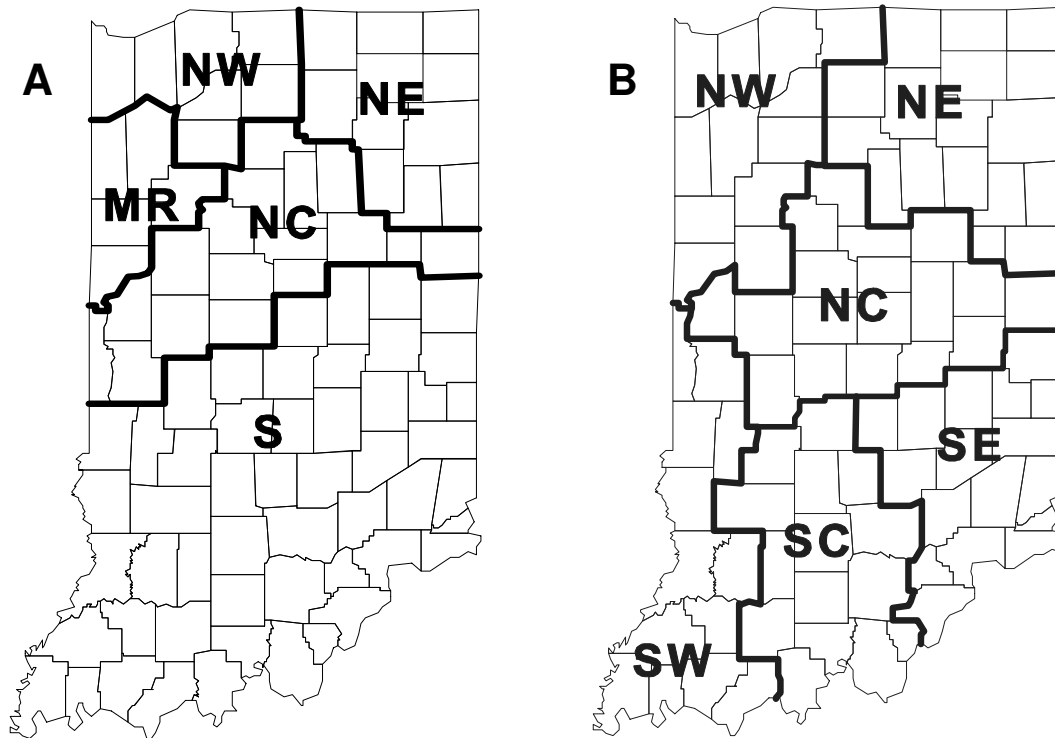
### RETURNING THE SURVEY

NO POSTAGE IS NECESSARY.

After you have answered the questions please fold so the business reply artwork is on the outside. Then tape the survey closed and drop it in the mail.



**Figure 2.** Maps showing Indiana's (A) Pheasant Harvest Regions, and (B) Small Game Harvest Regions (excluding pheasants).



**Figure 3.** The estimated number of small game hunters in Indiana from 1975-2005.

